# Patterns of Alcohol Use and the Risk of Drinking and Driving among US High School Students

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ABSTRACT

Approximately one third of deaths among persons aged 15 to 24 years are the result of motor vehicle–related crashes. Data from a national sample of US high school students were used to assess patterns of alcohol use among adolescents in relation to the risk of drinking and driving. Prevalence and odds ratios were calculated for drinking and driving associated with patterns of alcohol use. Drinking and driving increased with increasing frequency of alcohol use and binge drinking and when alcohol was used in addition to other drugs. Efforts to reduce drinking and driving among adolescents should address underage drinking that is frequent or heavy. (*Am J Public Health.* 1995;85:976–978)

## Introduction

In the United States, motor vehicle–related crashes account for more than 32% of all deaths among persons aged 15 to 24 years.[1] Because of the number of youths involved in alcohol-related crashes, reducing adolescent drinking and driving has become a national public health priority.[2]

Investigators have suggested that established patterns of alcohol use may play a major role in the decision making that precedes drinking and driving among adolescents.[3] To address this issue, we assessed the relationship of frequency of drinking and driving to frequency of alcohol use, binge drinking, use of alcohol plus other drugs, and onset of alcohol use at a young age.

## Methods

### Survey Design

The 1991 Youth Risk Behavior Survey was designed to assess the prevalence of risk behaviors associated with the leading causes of morbidity and death among adolescents in the United States.[4] Respondents were selected by means of a three-stage (counties, schools, and classes) cluster sample with a design that permitted the representative sampling of all students in grades 9 through 12 from public and private schools in the 50 states and the District of Columbia. Special efforts were made to ensure that responses to the self-administered, 75-item questionnaire remained anonymous. The school response rate was 75.3% and the student response rate was 90.4%. (More detailed information about the sampling procedure is available upon request.)

### Definitions

Students were considered to have been drinking and driving if they reported "drinking and driving" a motor vehicle at least once in the last month. Alcohol use was defined as use on at least 1 day in the last month. Binge drinking was defined as consumption of five or more drinks "in a row" at least once in the last month. Frequency of alcohol use and of binge drinking was defined as the number of days alcohol was used or consumed in binges, respectively, in the last month. Alcohol plus other drug use was defined as alcohol use on at least 1 day in the last month and marijuana or cocaine use at least once in the last month.

Of 12 272 students, 154 who had missing information about drinking and driving were excluded, leaving 12 118 (for a weighted count of 12 144).

### Statistical Analysis

Prevalence and the trends[5] associated with frequencies of alcohol use and

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binge drinking, alcohol plus other drug use, and years elapsed since first using alcohol were calculated. Nondrinkers were excluded from multivariate analyses. Logistic regression methods were used for complex survey design data to calculate odds ratios and the trends for drinking and driving associated with alcohol use patterns.[6] Odds ratios were calculated using indicator variables, and trends were assessed using ordinal variables. Because drinking and driving has been found to be higher among Whites and Latinos than among African Americans and higher among males than among females, and to increase with age and with decreasing school performance,[7] odds ratios were adjusted for the effects of race/ethnicity, sex, age, school performance, and the other alcohol use patterns.

## Results

Prevalence of reported alcohol use, binge drinking, and alcohol plus other drug use increased with age and with declining school performance (Table 1). First use of alcohol at age 14 or younger also increased with declining school performance. The prevalence for all these alcohol use patterns was greater for Whites and Latinos compared with African Americans and for males compared with females. Of all students, 17% reported drinking and driving at least once in the last month.[7]

Prevalence of drinking and driving increased substantially with frequency of alcohol use and binge drinking and with years elapsed since alcohol was first used (Table 2). Additionally, it was higher among students who used alcohol plus other drugs in the last month than among those who used only alcohol.

When trends in these relationships were assessed by adjusting for the effects of age, race/ethnicity, sex, school performance, and the other patterns of alcohol use, odds ratios were statistically significant for drinking and driving associated with frequency of alcohol use, frequency of binge drinking, and use of alcohol plus other drugs (Table 2). The adjusted odds ratio associated with years since alcohol was first used was not statistically significant.

**TABLE 1—Patterns of Alcohol Use by Age, Race/Ethnicity, Sex, and School Performance: 1991 Youth Risk Behavior Survey**

| | | % of Students[a] | | | |
|---|---|---|---|---|---|
| | Weighted Sample Size | Alcohol Use | Binge Drinking | Alcohol Plus Other Drug Use | Alcohol Use at Age 14 or Younger |
| Age, y | | | | | |
| ≤14 | 1136 | 39 | 21 | 6 | 38 |
| 15 | 2807 | 41 | 21 | 9 | 37 |
| 16 | 3194 | 52 | 32 | 14 | 43 |
| 17 | 2888 | 57 | 38 | 17 | 39 |
| 18+ | 2119 | 61 | 42 | 20 | 40 |
| School performance | | | | | |
| Excellent | 4848 | 44 | 26 | 9 | 33 |
| Average | 6343 | 53 | 34 | 15 | 42 |
| Below average | 938 | 70 | 47 | 31 | 58 |
| Unknown | 15 | | | | |
| Race/ethnicity | | | | | |
| White | 8507 | 53 | 35 | 15 | 42 |
| African American | 1729 | 42 | 17 | 12 | 29 |
| Latino | 1062 | 54 | 32 | 14 | 40 |
| Other | 827 | 43 | 24 | 12 | 35 |
| Unknown | 19 | | | | |
| Sex | | | | | |
| Female | 5949 | 49 | 26 | 12 | 36 |
| Male | 6193 | 53 | 37 | 16 | 43 |
| Unknown | 2 | | | | |
| Overall | 12 144 | 49 | 32 | 14 | 40 |

[a]Of the 12 118 students who were eligible for this study (representing a weighted count of 12 144), 529 (4%) had unknown information about alcohol use, binge drinking, alcohol and other drug use, or alcohol use at age 14 or younger.

## Discussion

Alcohol use is a necessary condition for drinking and driving. However, data about drinking and driving in relation to patterns of alcohol use are unavailable. In this study, we found graded increases in drinking and driving as alcohol use became frequent or heavy, or as other drugs were also used. Among those who drive after drinking, the relative risk of being involved in a crash is greater for young persons at all blood alcohol concentrations than it is for older persons.[8] Thus, one strategy to reduce adolescent drinking and driving, as set forth in *Healthy People 2000: National Health Promotion and Disease Prevention Objectives*,[2] is to address alcohol use among adolescents if it is frequent or heavy, or if other drugs are also being used.

Drinking and driving, frequent alcohol use, binge drinking, and abuse of other illicit drugs are just some examples of a larger class of adolescent problem behaviors increasingly considered deviant by experts.[9] Forty-six years ago, Tillman and Hobbs postulated that driving behavior was not an isolated activity but rather a "manifestation of a method of living"—in other words, "you drive as you live."[10] Now, studies have shown an association between frequent arrests for nonvehicular offenses and driving convictions or motor vehicle crashes.[11–13] Identifying adolescents with these patterns of destructive behavior may reduce not only vehicular fatalities but other dysfunctional behaviors as well.[14]

Reexamination of societal norms and parental attitudes toward underage drinking may be important steps in reducing adolescent drinking and driving. Strategies that address the relative ease with which adolescents can purchase alcoholic beverages have been shown to be influential in reducing alcohol consumption and motor vehicle crashes.[15,16] So too is strict enforcement of laws prohibiting the use of alcohol by youth.[16] Other policy measures that have been widely suggested include strict regulation of alcohol advertising[17]; promotion of educational programs for servers (bartenders, waiters, store clerks, etc.); encouragement of alcohol-free youth parties[3]; and alteration of community institutions, policies, and practices that make alcoholic beverages easily accessible to underage youth.[18] These approaches may take on a greater importance in light of recent research suggesting that punitive laws toward drinking and driving have had

**TABLE 2—Relationship between Drinking and Driving and Alcohol Use Patterns: 1991 Youth Risk Behavior Survey[a]**

| Alcohol Use Pattern | Weighted Sample Size | Drinking and Driving, % | Odds Ratio[b] | 95% Confidence Interval |
|---|---|---|---|---|
| Drinking frequency, days in previous month | | | | |
| 1–2 | 2519 | 14 | Referent | |
| 3–5 | 1436 | 30 | 2.5 | 1.9, 3.2 |
| 6–9 | 994 | 52 | 5.6 | 4.4, 7.1 |
| 10–19 | 780 | 62 | 8.1 | 5.9, 11.2 |
| 20+ | 206 | 74[c] | 14.1 | 8.5, 23.4[d] |
| Binge drinking, days in previous month | | | | |
| None | 2254 | 14 | Referent | |
| 1–2 | 1859 | 28 | 1.9 | 1.5, 2.5 |
| 3–5 | 879 | 53 | 4.9 | 3.8, 6.4 |
| 6–9 | 582 | 60 | 5.8 | 4.1, 8.3 |
| 10+ | 361 | 77[c] | 12.1 | 7.7, 19.0[d] |
| Years since first started drinking | | | | |
| 0.0–1.5 | 1502 | 22 | Referent | |
| 2.0–2.5 | 1118 | 27 | 0.8 | 0.5, 1.1 |
| 3.0–3.5 | 820 | 30 | 0.7 | 0.5, 1.1 |
| 4.5–5.5 | 1671 | 40 | 1.0 | 0.8, 1.4 |
| 6.5–9.5 | 824 | 47[c] | 0.9 | 0.6, 1.3 |
| Alcohol plus other drug use | | | | |
| Alcohol only | 4330 | 25 | Referent | |
| Alcohol plus other drugs | 1605 | 52 | 1.7 | 1.2, 2.3 |

[a]Of 12 118 students, we excluded from this analysis 5908 who were nondrinkers and 531 for whom data about alcohol use, other drug use, age, age at onset of alcohol use, sex, race/ethnicity, and school performance were unknown; 5679 remained for these analyses (representing a weighted count of 5935).
[b]Odds ratios were adjusted for age, race/ethnicity, sex, school performance, and other alcohol use patterns. Frequency of alcohol use and of binge drinking was not included in the same model.
[c]Trend in increasing prevalence is statistically significant ($P < .0001$; Cochran-Mantel-Haenszel test for trend).
[d]Trend in increasing odds ratios is statistically significant ($P < .0001$; test for linear trend).

little influence in reducing motor vehicle–related deaths.[19] □

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